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A new species of the genus *Acanthiulus* Gervais, 1844 (Diplopoda: Spirobolida: Pachybolidae) from Papua New Guinea

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Abstract: A new species, *Acanthiulus subcostulatus* sp. nov., is described from northern Papua New Guinea, distinguished from the sole, and type species, *A. blainvillei* (Leguillou, 1841), polymorphous and widespread across much of New Guinea and the Aru Archipelago, East Indonesia, by the smaller body (adults 8.5 *vs* >10 cm long), the characteristically striate/subcostulate metaterga devoid of any teeth, cones or spines, and the gonopodal structure. In particular, the sternum of the anterior gonopods is undivided distally (*vs* divided and diverging apically), and the apical parts of the posterior gonopods are helmet-shaped (*vs* much more open and trifid).

Keywords: Millipede, taxonomy, iconography, New Guinea.

Introduction

The present contribution continues the previous paper devoted to a review of the Papuan millipede genus *Acanthiulus* Gervais, 1844 and contained in the same volume (Golovatch *et al*. 2021). This note puts on record a second, new species of *Acanthiulus*, which has hitherto been considered a monospecific genus. The sole, and type species, *A. blainvillei* (Leguillou, 1841), is widespread across much of New Guinea and the Aru Archipelago, East Indonesia (Golovatch *et al*. 2021), whereas the new congener comes from northern Papua New Guinea. Since *Acanthiulus* has just been reviewed, and *A. blainvillei* shown to be polymorphous (Golovatch *et al*. 2021), there is no need to further detail the status, diversity and distribution of the genus and species.

Material and methods

The holotype of the new species was taken in 1977 by Galina F. Kurcheva during an expedition on board the research vessel "Dmitry Mendeleyev" to several islands and archipelagos in the southwestern Pacific. It has been deposited in the collection of the Zoological Museum of the Moscow State University (ZMUM), Russia.

Images were taken with a Canon EOS 5D digital camera and stacked using Zerene Stacker software.

Results

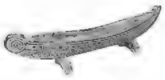
***Acanthiulus subcostulatus* sp. nov.** (Figs 1–15)

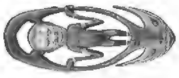
Holotype ♂ ZMUM: Papua New Guinea, Maclay Coast, near Kepoiak, S5°45', E146°35', forest litter, 13.II.1977, G. F. Kurcheva leg.

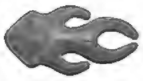
Derivatio nominis: To emphasize the heavily striate, subcostulate striations of metazonae across their entire circumference.

Diagnosis: Differs clearly from *A. blainvillei* (Leguillou, 1841), a polymorphous species widespread across much of New Guinea and the Aru Archipelago, East Indonesia (Golovatch *et al*. 2021), by the smaller body (adults 8.5 *vs* >10 cm long), the characteristically striate/subcostulate metaterga devoid of any teeth, cones or spines, and the gonopodal structure, in particular, the distally undivided sternum of the anterior gonopods (*vs* divided and diverging apically) and the helmet-shaped apical parts of the posterior gonopods (*vs* much more open and trifid).

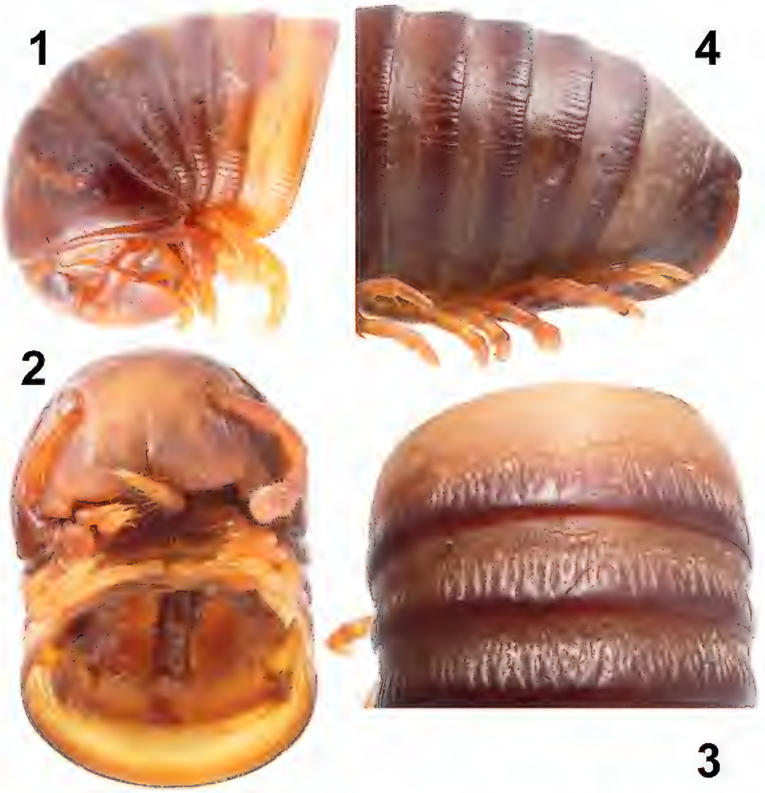
Description: Body ca. 85 mm long, width or height of midbody segments 7.2 mm, with 48p+T segments. Colouration mainly red-brown, pattern distinct and cingulate due to darker, red-brown





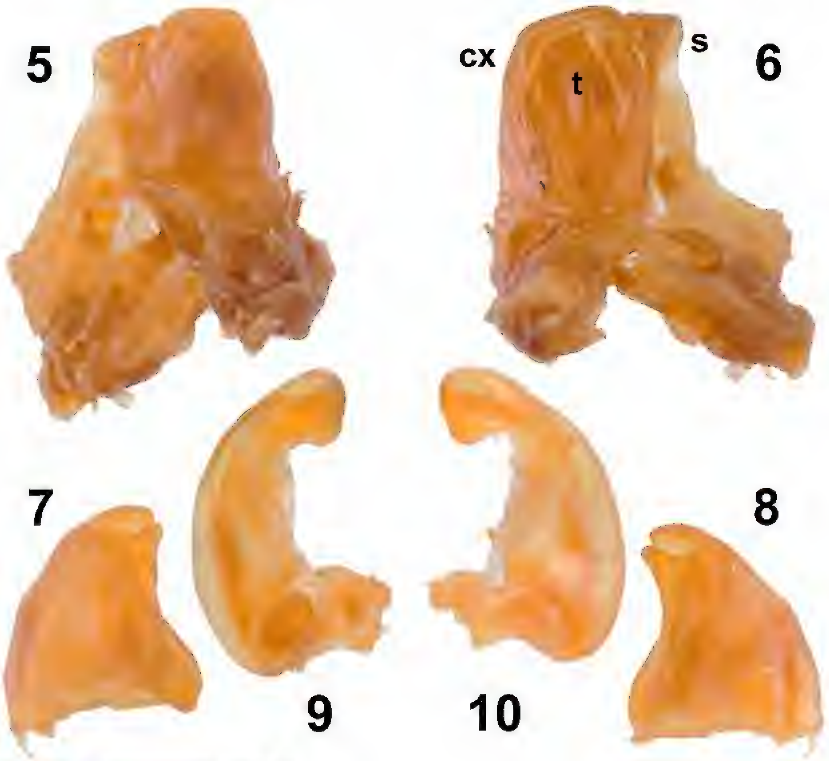


metazonae and much lighter, greyish to yellowish pro- and mesozonae; antennae, legs and most of head red-yellow; eye patches blackish brown (Figs 1–4). Body cylindrical, postcollum constriction very faint (Fig. 2). Head as usual, bare, with three small, but evident, central teeth at fore margin of, and a short, axial and distinct suture on, labrum, followed by a superficial, fine, axial, epicranial line, with ca. 7–8+7–8 labral and 2+2 supralabral setae (Fig. 2). Eye patches large and suboval (Fig. 1), each composed of ca. 30 flat ommatidia arranged in six vertical rows (ca. 4+6+6+6+5+4); interantennal isthmus >2x diameter of eye patch (Fig. 2). Antennae short and clavate, curved anteroventrad, in situ stretchable laterally behind segment 2; in length, antennomere 2 > 3 = 4 = 5 > 6 > 1 > 7; distal end of antennomere 4 and antennomeres 5–7 clothed with dense and rather long setae; 8th with four small apical cones (Figs 1–2). Tegument nearly smooth to finely leathery, mostly shining (Figs 1–4). Collum strongly narrowed laterad, broadly rounded and clearly bordered anteriorly, narrowly rounded and similarly bordered laterally, gently concave in caudobasal third, very briefly and slightly bordered at posterior margin (Fig. 1). Ventral corner of segment 2 hidden beneath collum. Segments/rings 2–6 with increasingly dense, clear, longitudinal, dorsal striations on metazonae, these striations on following segments being already deep, subcostulate, often irregular, confused and caudally abbreviated (Figs 1–4). Midbody segments/rings with faint sutures only between meso- and metazonae, these regions being very poorly constricted and slightly rugulose. Mesozonae finely and mostly horizontally striolate across entire circumference, only anteriorly obliquely striolate dorsad, same as prozonae with their particularly dense and vertical striolations. Scobinae absent. Ozopores small, inconspicuous, round disks lying just in front of and in touch with suture/line between meso- and metazonae, starting with segment 6 (Figs 1 & 4). Telson (Fig. 4) as usual, epiproct flat, small, digitiform, barely projecting behind apical end of paraprocts; the latter strongly and regularly convex, smooth, clearly impressed before prominent caudal lips with a small gutter between both valves; hypoproct nearly semicircular, strongly transverse, rounded caudally. Only ♂ segment 7 clearly swollen ventrally, a complete ring with a narrow bridge ventrally. No visible sigilla on internal surface of meso- and metazonae. Legs short and slender, more than half as long as midbody height, each with a spine above claw, 2–4 ventral spines on tarsi, and one strong ventral seta on each of other podomeres; ventral sole pads absent; coxae 3–5 somewhat expanded ventrally (♂) (Fig. 2). Gonopods strongly sclerotized (Figs 5–15). Anterior gonopods (Figs 5–8) with a large and subtriangular sternum showing a prominent, high and slender central process (s) with its rather narrowly rounded tip curved caudally, s being only slightly higher than large, roundly squarish

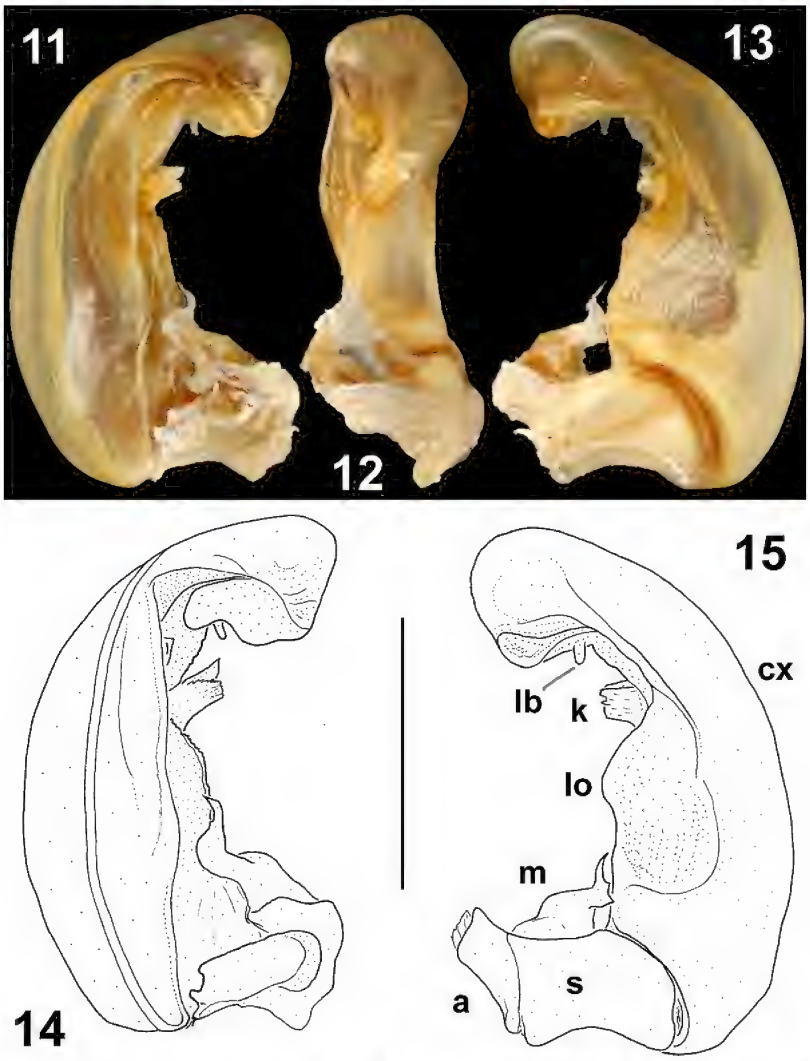


Figures 1–4. *Acanthiulus subcostulatus* sp. nov., ♂ holotype. 1–2 – Anterior part of body, lateral and ventral views, respectively; 3 – Middle part of body, dorsal view; 4 – Caudal part of body, lateral view [not to scale] (images courtesy Kirill V. Makarov).

coxae (cx) with a little smaller and subapically bilobed telopodites (t), each of these being fully contained inside a hollow on the caudal face of cx. Posterior gonopods (Figs 9–15) connected at midline through a paramedian pair of strong, chitinized, subhorizontal, sternal halves (s), each hollow on anterior side, attached basally to a partly membranous (m) tracheal apodeme (a), and



Figures 5–10. *Acanthiulus subcostulatus* sp. nov., holotype ♂. 5-6 – Sternum and right anterior gonopod, anterior and posterior views, respectively; 7–8 – Telopodite of left anterior gonopod, anterior and posterior views, respectively; 9–10 – Left posterior gonopod, anterior and posterior views, respectively [not to scale] (images courtesy Kirill V. Makarov). Designations explained in text.



Figures 11–15. Left posterior gonopod of *Acanthiulus subcostulatus* sp. nov., holotype ♂, anterior, mesal, posterior, anterior and posterior views, respectively [11–13 not to scale; scale bar for figures 14 & 15 – 2 mm] (images courtesy Kirill V. Makarov). Designations explained in text.

supporting a large, boat-shaped and mesally hollow coxa (cx), the latter clearly and regularly curved, and showing a low, mesal and very simple lobe (lo) with a small, midway, apically serrate, squarish and membranous outgrowth (k) on top (apparently, marking the end of a seminal groove), and a large, helmet-shaped and rather complex apical part with a very small, tongue-shaped and membranous lobule (lb) near base.

Differential diagnosis: The new species seems best to fit within the scope of *Acanthiulus*, not in the highly speciose and grossly sympatric genus *Trigoniulus* Pocock, 1894. Thus, the collum has very peculiar paraterga, i.e. long, subtriangular and strongly drawn ventrad (Fig. 1), just like in *Acanthiulus blainvillei* or *Zygostrophus* Chamberlin, 1920, a small genus from Australia (*vs* helmet-shaped, with short and broadly rounded paraterga in all *Trigoniulus* except *T. harpagus* Attems, 1914). The latter species comes from western New Guinea, first diagnosed in a key (Attems 1914), but fully described and illustrated only a little later (Attems 1917). The strongly subcostulate metaterga in *Acanthiulus subcostulatus* sp. nov. seem to be unique, more reminiscent of the often ribbed interspaces between the cones, teeth or spines in *A. blainvillei*, especially its morph B (Golovatch *et al*. 2021), than the metaterga only very seldom striolate dorsally as observed in *Trigoniulus*, e.g., *T. densestriatus* Attems, 1897 from Borneo (Attems 1897). Usually, the dorsum in *Trigoniulus* spp. is completely smooth (Attems 1914; 1932). In addition, neither *Acanthiulus blainvillei* nor *A. subcostulatus* sp. nov. shows the posterior gonopod equipped with a considerable and ornamented mesal branch so characteristic of most of *Trigoniulus* (Attems 1914; 1932) and its immediate allies like *Arisemolus* Hoffman, 1980 (Golovatch *et al*. 2020). Exceptionally, however, that branch is underdeveloped, e.g., in the dorsally smooth *Trigoniulus andropygus* Attems, 1914, again a species from western New Guinea which was first diagnosed in a key (Attems 1914), but fully described and illustrated only a little later (Attems 1917). That both *Acanthiulus blainvillei* and *A. subcostulatus* sp. nov. come from New Guinea and tend to be parapatric (near the Astrolabe Bay) seems to be another argument, albeit an indirect one, to treat them as being particularly close. The majority of spirobolidan systematics, including the Indo-Pacific Pachybolidae, remain badly confused and chaotic (Jeekel 2001). *Trigoniulus* taxonomy, with 80+ species involved, thereby seems to be particularly imperfect (cf. https://en.wikipedia.org/wiki/Trigoniulus and Jeekel (2001)).

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